

What is claimed:

1. A fuel cell assembly comprising:
  - (a) a portable fuel cell having a cathode in fluid connection with an oxidant intake port and an anode;
  - (b) a filter assembly positioned in fluid connection with the oxidant intake port and the cathode, the filter assembly comprising:
    - (i) at least one of a particulate removal feature and a chemical adsorbent feature; and
    - (ii) a water buffer feature;
  - (c) the filter assembly constructed and configured in the fuel cell so that oxidant, entering via the intake port, passes through the filter assembly, and so that water vapor, from the cathode, is managed by the water buffer feature to achieve a desired humidity level.
2. The fuel cell assembly according to claim 1, wherein the filter assembly comprises both the particulate removal feature and the chemical adsorbent feature.
3. The fuel cell assembly according to claim 2, wherein the filter assembly comprises one portion having the particulate removal feature, the chemical adsorbent feature and the water buffer feature therein.
4. The fuel cell assembly according to claim 3, wherein the filter assembly comprises a housing, with the particulate removal feature, the chemical adsorbent feature and the water buffer feature retained in the housing.
5. The fuel cell assembly according to claim 4, wherein the housing defines at least a portion of a diffusion channel.

6. The fuel cell assembly according to claim 2, wherein the filter assembly comprises one portion having the particulate removal feature and a second portion having the chemical adsorbent feature and the water buffer feature therein.
7. The fuel cell assembly according to claim 1, wherein the particulate removal feature is a membrane.
8. The fuel cell assembly according to claim 7, wherein the membrane is PTFE.
9. The fuel cell assembly according to claim 7 wherein the membrane is PVDF.
10. The fuel cell assembly according to claim 1, wherein the chemical adsorbent feature comprises activated carbon.
11. The fuel cell according to claim 10, wherein the chemical adsorbent feature comprises impregnated activated carbon.
12. The fuel cell assembly according to claim 1, wherein the fuel cell is operably connected to electronic equipment to provide power to the electronic equipment.
13. The fuel cell assembly according to claim 12, wherein the electronic equipment is one of a cell phone, personal computing device, or a lap top computer.
14. The fuel cell assembly according to claim 1, wherein the portable fuel cell has a weight of no greater than 2 kg.
15. A fuel cell assembly comprising:
  - (a) a portable, direct methanol fuel cell comprising:
    - (i) a cathode;
    - (ii) an anode; and

- (iii) a liquid methanol source in fluid contact with the anode, the methanol retained in a compartment having a vent, the vent providing fluid contact between an interior of the compartment and an exterior of the compartment; and
  - (b) a filter assembly positioned within the vent, the filter assembly configured for fluid connection between the interior of the compartment and the exterior of the compartment, the filter assembly comprising a selectively permeable hydrophobic and/or oleophobic feature.
- 16. The fuel cell assembly according to claim 15, wherein the selectively permeable hydrophobic and/or oleophobic feature is a membrane.
- 17. The fuel cell assembly according to claim 16, wherein the membrane is PTFE.
- 18. The fuel cell assembly according to claim 16, wherein the membrane is PVDF.
- 19. The fuel cell assembly according to claim 15, wherein the filter assembly further comprises an adsorbent feature.
- 20. The fuel cell assembly according to claim 15, wherein the portable fuel cell has a weight of no greater than 2 kg.